Medical Science

pISSN 2321–7359; eISSN 2321–7367

Shared decision making and its impact on medications adherence among diabetic patients in Buraidah, Saudi Arabia

Waleed Alresheedi[1*], **Unaib Rabbani**[2]

To Cite:
Alresheedi W, Rabbani U. Shared decision making and its impact on medications adherence among diabetic patients in Buraidah, Saudi Arabia. Medical Science, 2022, 26, ms134e2130.
doi: https://doi.org/10.54905/disssi/v26i122/ms134e2130

Authors' Affiliation:
[1]R4 Family Medicine Resident, Family Medicine Academy, Qassim Health Cluster, Buraidah, Saudi Arabia
[2]Trainer at Family Medicine Academy, Qassim Health Cluster, Buraidah, Saudi Arabia

***Corresponding Author**
Senior R4 Resident, Family Medicine, Family Medicine Academy, Qassim Health Cluster, Buraidah, Saudi Arabia

Peer-Review History
Received: 21 February 2022
Reviewed & Revised: 23/February/2022 to 08/April/2022
Accepted: 09 April 2022
Published: 18 April 2022

Peer-review Method
External peer-review was done through double-blind method.

URL: https://www.discoveryjournals.org/medicalscience

ABSTRACT

Background: Shared Decision Making (SDM) is a method in which patients and doctors share knowledge about patient needs, care choices, and tradeoffs in order to reach treatment decisions. *Objective:* To assess the medication adherence and SDM and association between them among diabetic patients visiting primary health care in Buraidah, KSA. *Methods:* Cross sectional study was carried out between diabetic patients visiting primary healthcare centers in Buraidah, Al-Qassim, Saudi Arabia. Data were collected by structured interview conducted by trained researcher assistant using two valid questionnaires; 9-item Shared Decision-Making Questionnaire (SDM-Q-Doc-patient version), and General Medication Adherence Scale (GMAS). Logistic regression is being used to evaluate the association of medication adherence with SDM. *Results:* A total of 377 participants were included. We found that (79.5%) of diabetic patients were conscientious about taking their medications. The rate of shared decision making on scale of 100 was 71.8. We found a significant negative association between score of SDM and risk of non-adherence adjusted OR 0.97 (95% CI: 0.96 -0.98). *Conclusion:* Overall about 20% of the diabetics were non-adherent which may lead to complications and burden on health system. SDM was positively in regard to medication adherence. Therefore, SDM should be implemented in the primary medical services and physicians should be provided with required training in order to improve the outcome of diabetic care. We also recommend further large-scale studies to see effects of SDM on adherence among patients of other chronic diseases and quality of life.

Keywords: Adherence, Diabetes, Medication, Shared decision making, Saudi Arabia

1. INTRODUCTION

Good communication between the doctor and the illness is a crucial component of treatment process that every physician should have these skills.

One of these capabilities is Shared decision making (SDM). SDM is a method in which patients and doctors share knowledge about patient needs, care choices, and tradeoffs in order to reach treatment decisions (Charles et al., 1997; Shahrzad & Narjes, 2019). SDM is a main factor for achieving professional medical treatment and indicates good medical care (Hoffmann et al., 2014). SDM consists of three elements: exchange of knowledge between the illness and doctor, selection of diagnostic and therapeutic options, and acceptance (Elwyn et al., 2014; Shay and Lafata, 2015).

SDM is especially essential for chronic medical illnesses because the patient may need to self-manage and implement such lifestyle changes; thus, their feedback and desires are essential to ensure that these changes are both acceptable and manageable in the long term (Peek et al., 2014). Given the fact that significant steps were taken to support SDM, physicians still face the challenge and there is little evidence of its influence (Libert et al., 2017; Tamirisa et al., 2017). There have been studies conducted on patients with schizophrenia and uncontrolled asthma to assess making use of SDM and its effect on medications adherence (Fiorillo et al., 2020; Wilson et al., 2010). However, to best of our knowledge, there is no study published which reported making use of SDM and its impact on compliance to treatments across diabetic patients in Kingdom of Saudi Arabia (KSA). The goal of this research was to measure the levels of medication adherence and SDM and their association among diabetic patients who come to primary health care in Qassim KSA.

2. METHODOLOGY

Study design and setting

A cross sectional study was carried out at primary healthcare (PHC) centers in Buraidah, Saudi Arabia from July to August 2021. Buraidah is the largest city of Qassim region of KSA with and estimated population of about 700000 people.

Study population

Study population of this study included patients with diabetes who attend a chronic illnesses clinic in primary healthcare centers of Buraidah, Al-Qassim, Saudi Arabia. We included all the patients of either gender who are more than 18 years old, diagnosed for diabetes for at least one year and taking pharmacotherapy from chronic disease clinics in center for primary health care in Buraidah. We excluded those with gestational diabetes, severe disease and mental illness.

Sample Size

Sample size was calculated using OpenEpi online sample size calculator. Total number of diabetic patients registered in PHC centers of Buraidah is 17,939. We assumed the prevalence of non-adherence to be 50% as no other studies were available. At 95% confidence level, 5% margin of error and using finite population correction, the sample size calculated was 377.

Sampling Technique

In the Buraidah, there are about forty functioning PHC centers that provide diabetes treatment. Ten PHC centers were chosen through a computer generated simple random sampling. Every one of the PHCs which were selected, patients who were eligible based on our criteria was selected consecutively through convenience sampling method.

Data collection tools and procedure

The researcher gathered the information using a well-organized questionnaire in Arabic. There were three sections in the questionnaire.

Socio-demographic and clinical data

This section included questions on; age, gender, nationality (either Saudi or non-Saudi), marital status, education, job status, duration of DM in years, history of chronic diseases (other than DM), number of daily medications for all chronic diseases including DM, number of daily antihyperglycemic drugs and smoking.

Shared Decision Making Questionnaire (SDM-Q-Doc-patient version)

The nine-item Shared Decision-Making Questionnaire is a self- reported instrument designed to assess how patients view the process of shared decision making (SDM-Q-9). The scale has nine components, each of which covers a phase in the SDM procedure, for example “My doctor made clear that a decision needs to be made”. All items are graded on a six-point from 0 to 5, on a Likert scale (completely disagree) to (completely agree). The total raw score of the SMD-Q-9 ranges from 0 to 45. Zero indicates the lowest level of sharing and 45 represents the highest degree (Kriston et al., 2010; Makoul and Clayman, 2006). The raw scores were

converted into 100 scale using standard methods. Validated Arabic version of the SDM-9 was used in this study (Alzubaidi et al., 2019).

General Medication Adherence Scale (GMAS)

This scale comprised of 11 multiple-choice questions divided into three parts, each with four alternative answers. Component 1 assessed adherence through patient behavior, while component 2 assessed adherence by other diseases and number of medications. The final metric was cost-based adherence. Each item had its own score, which ranged from 0 to 3. Total adherence for a patient was classified as high (30–33), good (27–29), partial (17–26), low (11–16), and bad (≤10) based on total of all 11 individual item ratings. Naqvi and colleagues have previously defined the scale, its sub-scales, and scoring technique (Naqvi et al., 2019; Naqvi et al., 2020). We used validated Arabic version of GMAS after written approval from the authors (Naqvi & Mahmoud, 2020).

In the selected PHCs, visitors of chronic disease clinics were assessed from eligibility and asked to take part in the research. After taking their consent, data was collected in a separate room by the principal investigator.

Statistical analysis

Analysis was done on Statistical Package for Social Science (SPSS) version 21. We calculated frequencies and percentages for qualitative variables. For quantitative factors such as age, mean and standard deviation were calculated. To assess the association of medication adherence with shared decision making, logistic regression analysis was used. All the variables were assessed in univariate logistic regression followed by multivariate analysis. Variables with p-value <0.2 in the univariate analysis and biological importance were carried in the multivariate analysis. Variables were included in the final regression model based on their significance and effects on -2 log likelihood ratios. Crude and adjusted odds ratio (aOR) along with 95% confidence intervals (CI) were calculated. P-value of < 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval for the study was received from Qassim regional bioethics committee. Participant consent was obtained after full explanations about the study purpose, the right to refuse to participant and the protection of privacy and confidentially.

3. RESULTS

A total of 370 participants completed the questionnaire. The mean age was 54.1± 12.5 years and 60% were female. Majority 97.3% were Saudi nationals and 78.6% were married. According to educational level 47% of the studied patients had education up to secondary school level and 28.4% of them were unemployed. Near 10% of the participants were smokers. The mean duration of diabetes was 9.5 ± 6.8 years with number of diabetes medications 2.4% ± 1.2 medicines. Near half (48.4%) were taking medications twice a day. Other chronic diseases were present in 52.7% of participants. Table 1 summarizes sociodemographic characteristics of the sample.

Table 1 Socio-demographic characteristics of study participants (n=370)

Variable	% (n)
Age Mean (SD)	 54.1(12.5)
Gender Male Female	 40(148) 60(222)
Marital Status Single Married Ever Married	 11.4(42) 78.6(291) 10(37)
Nationality Saudi Non-Saudi	 97.3(360) 2.7(10)

Education level	
Illiterate	27.3(101)
Up to secondary	47(174)
Above secondary	25.7(95)
Employment	
Employed	21.6(80)
Unemployed	28.4(105)
Retired	20.3(75)
Other	29.7(110)
Smoking	
Yes	9.7(36)
No	90.3(334)
Other chronic diseases	
Yes	52.7(195)
No	47.3(175)
Number of DM medications	
Mean (SD)	2.4(1.2)
Frequency of medications	
OD	11.9(44)
BID	48.4(179)
TID	39.7(147)
DM duration	
Mean (SD)	9.4(6.8)
Total number of medications	
Mean (SD)	4.4(2)

The mean shared decision-making score on scale of 100 was 71.8 ±24. Overall, 64.3% of patients were labelled as having a high adherence in grading of medications adherence for all categories. When we dichotomized adherence, 79.5% of them was adherent (Figure 1). In subdomains of adherence, the lowest proportion non-adherence was in the behaviour domain (65.1%). Highest adherence was in financial domain (87%) (Table 2).

Table 3 presents the results of the univariate and multivariate logistic regression model showing variables significantly associated with medication adherence. In the univariate analysis we found that frequency of medication and shared decision making were significant factors. In the multivariate analysis, education up to secondary level was significantly associated with non-adherence aOR 3.24 (95% CI:1.54 - 6.83). As compared to once a day, BID aOR 0.44 (95% CI: 0.20-0.97) and TID aOR 0.37 (95% CI: 0.16 -0.86) found to be associated lower odds of non-adherence. Shared decision making was found to be an independent predictor of adherence. The odds of non-adherence reduced by 3% with one point increase in shared decision-making score aOR 0.97 (95% CI: 0.96 -0.98). No association was found between medication adherence and age, gender, marital status, employment, smoking, comorbidities, number of medications and duration of diabetes.

Table 2 Level of shared decision making and adherence among diabetic patients

Variable	% (n)
Shared decision making (100 scale)	
Mean (SD)	24 (71.8)
Adherence (Overall)	
High Adherence	64.3 (238)
Good Adherence	15.1 (56)
Partial Adherence	19.5 (72)
Low Adherence	0.8 (3)
Poor Adherence	0.3 (1)
Behavior	

High Adherence	65.1(241)
Good Adherence	17.8 (66)
Partial Adherence	12.7 (47)
Low Adherence	3.5 (13)
Poor Adherence	0.8 (3)
Multiple diseases	
High Adherence	75.7 (280)
Good Adherence	12.2 (45)
Partial Adherence	10(37)
Low Adherence	1.9(7)
Poor Adherence	0.3 (1)
Financial	
High Adherence	87 (322)
Good Adherence	6.8 (25)
Partial Adherence	3.2(12)
Low Adherence	1.1 (4)
Poor Adherence	1.9(7)

Table 3 Association of medication adherence with shared decision making among diabetic patients

Variable	Univariate		Multivariate	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Age©	1.0 (0.98 – 1.02)	0.961	--	--
Gender				
Male	1			
Female	1.02 (0.61 – 1.72)	0.916	--	--
Marital status				
Single	1		1	
Currently married	0.99 (0.43 – 2.25)	0.982	1.15 (0.45 -2.92)	0.767
Ever married	2.30 (0.82 – 6.41)	0.111	3.12 (0.95 - 10.24)	0.061
Education				
Illiterate	1		1	
Up secondary	1.69(0.89 – 3.19)	0.106	3.24 (1.54 - 6.83)	0.002
Above secondary	1.24(0.59 – 2.60)	0.566	1.68 (0.74 -3.77)	0.214
Employment				
Employed	1			
Unemployed	1.14 (0.55 – 2.38)	0.711		
Retired	1.17 (0.53 -2.58)	0.688	--	--
Other	1.14(0.55 – 2.36)	0.713		
Smoking				
No	1			
Yes	1.11 (0.48 – 2.56)	0.793	--	--
Other chronic diseases				
No	1		1	
Yes	1.39 (0.83 – 2.23)	0.203	1.78 (0.91 -3.48)	0.087
Number of medicines©	1.00 (0.81 – 1.23)	1.000	--	--
Frequency of medicines				
OD	1		1	
BID	0.47 (0.22 – 0.97)	0.041	0.44 (0.20-0.97)	0.043
TID	0.41 (0.19 – 0.88)	0.022	0.37 (0.16 -0.86)	0.022
DM duration©	1.00 (0.96 – 1.04)	0.831	--	--

Total number of medicines©	0.99 (0.87 – 1.12)	0.898	0.91 (0.77 - 1.07)	0.285
Shared decision making©	0.98 (0.97 – 0.99)	<0.001	0.97 (0.96 -0.98)	<0.001
©Continuous variable				

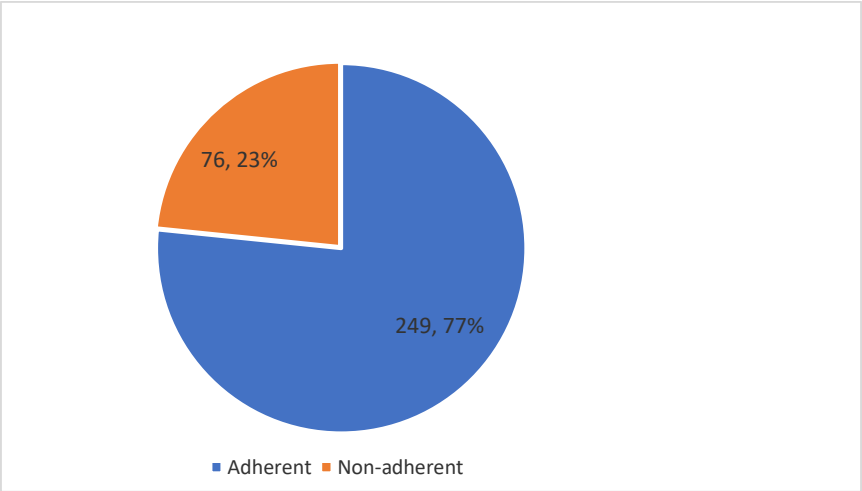

Figure 1 Prevalence of medication adherence

4. DISCUSSION

This study is one of its kinds to assess the association of Shared decision making with medications adherence among diabetic patients. We found that (79.5%) of diabetic patients in primary health care in Qassim KSA were adherent on them medications and shared decision making was positively associated with medication adherence. In our study, 20.5% of the diabetics were non adherent. Our estimate of non-adherence is lower than other studies from Saudi Arabia. A study from Jeddah, Saudi Arabia, reported that 31.5% diabetics were not adherent (Alshehri et al., 2020). Another study from Al-Qassim Region, Saudi Arabia, found non-adherence among diabetic patients to be 44% (Eltaher et al., 2020).

A study from Al-Khobar, Saudi Arabia, reported that about 64% of diabetic patients were non-adherent (AlQarni et al., 2019). In comparison to other Gulf countries, diabetic patients in UAE had the highest level of self-reported adherence to anti-diabetic drugs (84%) (Arifulla et al., 2014). Conversely, diabetic patients from Palestine showed lower compliance to their recommended treatment plan 58% (Aker et al., 2005). Furthermore, 23.7%were found to be non-compliant, in a study from Lahore, Pakistan (Zahid et al., 2017).

In Egypt, the adherence in diabetic patients was fairly good as only 26% of the patients had poor adherence (Heissam et al., 2015). These differences in estimates of non-adherence across the studies could be due to variations in the tools used for the measurements of non-adherence. According to studies, measuring adherence and patient compliance is difficult and, especially the patient based (Brundisini et al., 2015; Khattab, 1999; Osterberg and Blaschke, 2005). Other factors which could explain these differences include; studied population characteristics and quality of health care. None-the-less, about one fifth of the diabetics were non-adherent which may lead to further complications and burden on individuals and health system. His is something that has to be solved by implementing effective counselling for patients on long term medication and their health.

Frequency of medications showed positive association with adherence in univariate and multivariate analysis. Patients taking TID regimen were more probable to be adherent in our study. This could be related to the fact that patients in our study were elderly, had comorbidities, and had a higher number of medications as they get older. Patients on previous drug therapy may be more aware of the essence of adherence. Adherence awareness may improve as a result of prior pharmaceutical therapy experience (AlQarni & AlQarni, 2019). When more information more about benefits of medication adherence was provided, elderly patients with various comorbidities in Tanzania and Switzerland exhibited good adherence (Huber and Reich, 2016; Rwegerera, 2014).

On other hand, according to a recent study people with numerous comorbidities and various drugs had lower adherence (Osterberg and Blaschke, 2005). This result could suggest communication gaps between patients and physicians, and a lack of understanding of disease treatments and consequences. The number of medicines patients take is determined by the severity of their diabetes and comorbidities. Consequently, a patient with complicated regimen may find it difficult to stick to all of their drugs.

The association of education level with medication adherence is inconsistent in literature. We found that, high adherence was associated with education level up to secondary school levels. Some studies have reported similar finding (Ghods and Nasrollahzadeh, 2002). On the other hand, others reported no such association (Spikmans et al., 2003).

Patients with lower education have good adherence, according to a report published in the United Kingdom (Kyngäs and Lahdenperä, 1999; Senior et al., 2004). It's possible that patients with a lower level of education have more confidence in the doctor's advice. In any case, such findings suggest that education may not be a useful indicator of medications adherence. Shared decision making has implications on patient's outcomes and satisfaction with process of care. Studies on various chronic disease patients have shown such associations (Horbach et al., 2017; Lam et al., 2014; Nakayama et al., 2020).

We found that adherence to diabetic medications was positively associated with SDM. A meta-analysis reported that shared decision making among type II diabetic was associated with improved care process and quality of decision. Consequently, no link was discovered with glycaemic control (Kashaf et al., 2017). A recent study however, reported a better glycaemic control to be linked to SDM (Wang et al., 2019). We did not find any study reporting association of SDM with medication adherence among diabetic patients. However, studies on other chronic diseases such as autoimmune diseases, asthma and mental illnesses have shown that shared decision making influences the medication adherence (De las Cuevas et al., 2014; Lofland et al., 2017; Norful et al., 2020).

Our finding has both research and practice implications that there is dire need to study the level of shared decision making and its impact on medication adherence and patients' outcomes among diabetics, and implementation of shared decision making as essential part of diabetic care in PHC centers to improve the medication adherence. This would require identifying the physicians competencies (Murray et al., 2006).

Our study investigated medication adherence, level of shared decision making and their association among diabetic patients using validated tools. However, there are certain limitations which need to be considered while interpreting our findings. First, the design was a cross-sectional, which does not allow for a causal relationship of shared decision making and its effect on medications adherence among diabetic patients. Secondly, participants in our study were recruited from PHC centers of single city; therefore results may not be generalizable to whole country. Finally, our sample had power for medication adherence level only, not for associations. Nevertheless, were able to find a positive association between shared decision making and medication adherence.

5. CONCLUSION

We found that about one fifth of the diabetic were non adherent to their medications. We also found SDM to be a significant predictor medication adherence. These results call policy makers to effectively implement SDM in the primary care for chronic diseases patients. This will improve their medication compliance and will help reduce complications and uncontrolled diseases. In this regard, physicians should be trained in communication skills and shared decision making. We also recommend for large scale studies to look into the impacts of SDM on patient outcomes such as complications and quality of life.

Institutional Review Board (IRB) Statement

Before collection of the data, IRB approval was taken from regional Research Ethics Committee, Qassim with ethical approval number 1442-1934857.

Acknowledgement

The authors of this article are appreciative to all participants in this project, particularly the Primary Health Care Centers and their personnel, for their cooperation and ongoing support in data gathering. We also thanking to our data collectors Reem Abdulaziz Almuhaymidi, Shahad Mohammed AlJameli and Raghad Ibrahim Alhomidan for their help in data collection and appreciated.

Author Contributions

Principal Investigator: Research idea development from the principal investigator, also involved in review of literature, tool development, data collection and manuscript writing.

Co-investigator (Research Supervisor): Involved in all stages of development, monitoring, data analysis and manuscript writing and editing task till final stage of manuscript preparation.

Funding

This study has not received any external funding.

Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Aker O, Hamooz S, Sweileh W. Rate of compliance among patients with diabetes mellitus and hypertension. An-Najah Univ J Res- A (Natural Sciences) 2005; 19(1):1-11 DOI: https://journals.najah.edu/article/612/.
2. AlQarni K, AlQarni EA, Naqvi AA, AlShayban DM, Ghori SA, Haseeb A, Raafat M, Jamshed S. Assessment of medication adherence in saudi patients with type II diabetes mellitus in Khobar City, Saudi Arabia. Front Pharmacol 2019; 10:1306 DOI: 10.3389/fphar.2019.01306.
3. Alshehri KA, Altuwaylie TM, Alqhtani A, Albawab AA, Almalki AH. Type 2 diabetic patient's adherence towards their medications. Cureus 2020; 12(2) DOI: 10.7759/cureus .6932.
4. Alzubaidi H, Hussein A, Mc Namara K, Scholl I. Psychometric properties of the Arabic version of the 9-item Shared Decision-Making Questionnaire: the entire process from translation to validation. BMJ open 2019; 9(4):e026672 DOI: 10.1136/bmjopen-2018-026672.
5. Arifulla M, Lisha Jenny J, Sreedharan J, Muttappallymyalil J, Basha SA. Patients' adherence to anti-diabetic medications in a hospital at Ajman, UAE. Malaysian j med sci 2014; 21(1):44.
6. Brundisini F, Vanstone M, Hulan D, DeJean D, Giacomini M. Type 2 diabetes patients' and providers' is differing perspectives on medication nonadherence: a qualitative meta-synthesis. BMC Health Serv Res 2015; 15(1):1-23 DOI: 10.1186/s12913-015-1174-8.
7. Charles C, Gafni A, Whelan T. Shared decision-making in the medical encounter: what does it mean? (or it takes at least two to tango). Soc Sci Med 1997; 44(5):681-92 DOI: 10.1016/s0277-9536(96)00221-3.
8. De las Cuevas C, Peñate W, de Rivera L. To what extent is treatment adherence of psychiatric patients influenced by their participation in shared decision making? Patient Prefer Adherence 2014; 8:1547 DOI: 10.2147/PPA.S73029.
9. Eltaher SM, Rashid MA, Mahdy AW, Lotfy AMM. Physicians' Empathy and Its Effect on Adherence to Treatment of Diabetic Patients in Al-Qassim Region, Saudi Arabia. Ann Trop Med Health 2020; 23:638 DOI: 10.36295/ASRO.2020.231638.
10. Elwyn G, Dehlendorf C, Epstein RM, Marrin K, White J, Frosch DL. Shared decision making and motivational interviewing: achieving patient-centered care across the spectrum of health care problems. Ann Fam Med 2014; 12(3):270-5 DOI: 10.1370/afm.1615.
11. Fiorillo A, Barlati S, Bellomo A, Corrivetti G, Nicolò G, Sampogna G, Stanga V, Veltro F, Maina G, Vita A. The role of shared decision-making in improving adherence to pharmacological treatments in patients with schizophrenia: a clinical review. Ann Gen Psychiatry 2020; 19(1):1-12 DOI: 10.1186/s12991-020-00293-4.
12. Ghods A, Nasrollahzadeh D. Noncompliance with immunosuppressive medications after renal transplantation. Tissue Antigens 2002; 60(6):553 DOI: 10.1034/j.1399-0039.2002.00010.
13. Heissam K, Abuamer Z, El-Dahshan N. Patterns and obstacles to oral antidiabetic medications adherence among type 2 diabetics in Ismailia, Egypt: a cross section study. Pan Afr Med J 2015; 20. DOI: 10.11604/pamj.2015.20.177.4025.
14. Hoffmann TC, Montori VM, Del Mar C. The connection between evidence-based medicine and shared decision making. JAMA 2014; 312(13):1295-6 DOI: 10.1001/jama.2014.10186.
15. Horbach SE, Ubbink DT, Stubenrouch FE, Koelemay MJ, van der Vleuten CJ, Verhoeven BH, Reekers JA, Kool LJS, van der Horst CM. Shared decision-making in the management of congenital vascular malformations. Plast Reconstr Surg 2017; 139(3):725e-34e DOI: 10.1097/PRS.0000000000003083.
16. Huber CA, Reich O. Medication adherence in patients with diabetes mellitus: does physician drug dispensing enhance quality of care? Evidence from a large health claims database in Switzerland. Patient prefer adherence 2016; 10:1803 DOI: 10.2147/PPA.S115425.
17. Kashaf MS, McGill ET, Berger ZD. Shared decision-making and outcomes in type 2 diabetes: a systematic review and meta-analysis. Patient Educ Couns 2017; 100(12):2159-71. DOI: 10.2147/PPA.S115425.
18. Khattab M. Compliance and control of diabetes in a family practice setting, Saudi Arabia. East Mediterr Health J 1999; 5(4):755-65.
19. Kriston L, Scholl I, Hölzel L, Simon D, Loh A, Härter M. The 9-item Shared Decision Making Questionnaire (SDM-Q-9). Development and psychometric properties in a primary care sample. Patient Educ Couns 2010; 80(1):94-9 DOI: 10.1016/j.pec.2009.09.034.

20. Kyngäs H, Lahdenperä T. Compliance of patients with hypertension and associated factors. J Adv Nurs 1999; 29(4):832-9 DOI: 10.1046/j.1365-2648.1999.00962.x.
21. Lam WW, Kwok M, Chan M, Hung WK, Ying M, Or A, Kwong A, Suen D, Yoon S, Fielding R. Does the use of shared decision-making consultation behaviors increase treatment decision-making satisfaction among Chinese women facing decision for breast cancer surgery? Patient Educ Couns 2014; 94(2):243-9 DOI: 10.1016/j.pec.2013.11.006.
22. Libert Y, Canivet D, Ménard C, Van Achte L, Farvacques C, Merckaert I, Liénard A, Klastersky J, Reynaert C, Slachmuylder J-L. Predictors of physicians' communication performance in a decision-making encounter with a simulated advanced-stage cancer patient: A longitudinal study. Patient Educ Couns 2017; 100(9):1672-9 DOI: 10.1016/j.pec.2017.02.025.
23. Lofland JH, Johnson PT, Ingham MP, Rosemas SC, White JC, Ellis L. Shared decision-making for biologic treatment of autoimmune disease: influence on adherence, persistence, satisfaction, and health care costs. Patient prefer adherence 2017; 11:947 DOI: 10.2147/PPA.S133222.
24. Makoul G, Clayman ML. An integrative model of shared decision making in medical encounters. Patient Educ Couns 2006; 60(3):301-12 DOI: 10.1016/j.pec.2005.06.010.
25. Murray E, Charles C, Gafni A. Shared decision-making in primary care: tailoring the Charles et al. model to fit the context of general practice. Patient Educ Couns 2006; 62(2):205-11 DOI: 10.1016/j.pec.2005.07.003Get.
26. Nakayama K, Osaka W, Matsubara N, Takeuchi T, Toyoda M, Ohtake N, Uemura H. Shared decision making, physicians' explanations, and treatment satisfaction: a cross-sectional survey of prostate cancer patients. BMC Med Inform Decis Mak 2020; 20(1):1-10 DOI: 10.1186/s12911-020-01355-z.
27. Naqvi AA, Hassali MA, Jahangir A, Nadir MN, Kachela B. Translation and validation of the English version of the general medication adherence scale (GMAS) in patients with chronic illnesses. J Drug Assess 2019; 8(1):36-42 DOI: 10.1080/21556660.2019.1579729.
28. Naqvi AA, Mahmoud MA, AlShayban DM, Alharbi FA, Alolayan SO, Althagfan S, Iqbal MS, Farooqui M, Ishaqui AA, Elrggal ME. Translation and validation of the Arabic version of the General Medication Adherence Scale (GMAS) in Saudi patients with chronic illnesses. Saudi Pharm J 2020; 28(9):1055-61 DOI: 10.1080/21556660.2019.1579729.
29. Norful AA, Bilazarian A, Chung A, George M. Real-world drivers behind communication, medication adherence, and shared decision making in minority adults with asthma. J Prim Care Community Health 2020; 11:2150132720967806 DOI: 10.1177/2150132720967806.
30. Osterberg L, Blaschke T. Adherence to medication. N Engl J Med 2005; 353(5):487-97 DOI: 10.1056/NEJMra050100.
31. Peek ME, Drum M, Cooper LA. The association of patient chronic disease burden and self-management requirements with shared decision making in primary care visits. Health Serv Res Manag Epidemiol 2014; 1:2333392814538775 DOI: 10.1177/2333392814538775.
32. Rwegerera GM. Adherence to anti-diabetic drugs among patients with Type 2 diabetes mellitus at Muhimbili National Hospital, Dar es Salaam, Tanzania-A cross-sectional study. Pan Afr Med J 2014; 17 DOI: 10.11604/pamj.2014.17.252.2972.
33. Senior V, Marteau TM, Weinman J, Group GRAfFTS. Self-reported adherence to cholesterol-lowering medication in patients with familial hypercholesterolaemia: the role of illness perceptions. Cardiovasc Drugs Ther 2004; 18(6):475-81.
34. Shahrzad G, Narjes MS. A decision aid to support breast cancer patients. Medical Science 2019; 23(96):238- 243
35. Shay LA, Lafata JE. Where is the evidence? A systematic review of shared decision making and patient outcomes. Med Decis Making 2015; 35(1):114-31. DOI: 10.1177/0272989X14551638.
36. Spikmans F, Brug J, Doven M, Kruizenga H, Hofsteenge G, Van Bokhorst-van der Schueren M. Why do diabetic patients not attend appointments with their dietitian? J Hum Nutr Diet 2003; 16(3):151-8 DOI: 10.1046/j.1365-277X.2003.00435.x.
37. Tamirisa NP, Goodwin JS, Kandalam A, Linder SK, Weller S, Turrubiate S, Silva C, Riall TS. Patient and physician views of shared decision making in cancer. Health Expect 2017; 20(6):1248-53 DOI: 10.1111/hex.12564.
38. Wang M-J, Hung L-C, Lo Y-T. Glycemic control in type 2 diabetes: role of health literacy and shared decision-making. Patient prefer adherence 2019; 13:871 DOI: 10.2147/PPA.S202110.
39. Wilson SR, Strub P, Buist AS, Knowles SB, Lavori PW, Lapidus J, Vollmer WM. Shared treatment decision making improves adherence and outcomes in poorly controlled asthma. Am J Respir Crit Care Med 2010; 181(6):566-77 DOI: 10.1164/rccm.200906-0907OC
40. Zahid A, Ayub MA, Saeed M, Pasha N, Dar AJ, Javed H, Shakeel A, Nasir A, Akbar A, Tarrar Z. Treatment compliance in diabetics: physician-patient relationship. Ann King Edward Med Univ 2017; 23(4):503-7 DOI: 10.21649/journal.akemu/2017/23.4.503.507.